

## REMARKS

This Response addresses the issues raised by the Examiner in the Office Action mailed May 26, 2004. Initially, Applicants would like to thank the Examiner for the careful consideration given this case. In view of the following remarks, Applicants feel that all outstanding issues have been addressed and prompt allowance of all remaining claims is respectfully requested.

Claim 22 and 23 have been amended to cure the informalities noted by the Examiner. This amendment is not made for reasons of patentability.

The Examiner rejected Claims 19-23 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,343,163 to Kawanishi ("Kawanishi") in view of articles by Lee et al ("Lee"). Specifically, the Examiner held that Kawanishi "discloses in Figs. 1-13 an optoelectronic waveguiding device comprising DFB laser part 106, an electro-absorption modulator part 102 and an optical waveguide 140 optically connects the laser part and the modulator part, wherein the optical waveguide 140, the optical waveguide 120 and/or the absorbing layer 122 have bulk crystal structure." The Examiner then pointed out deficiencies in the manufacturing method described in Kawanishi, but the Examiner argued that the Lee articles suggested the remaining claim elements.

Respectfully, Applicants disagree with the Examiner's characterization of these references. However, in an effort to bring the present prosecution to a successful conclusion, Applicants have made the above clarifying amendments in order to more significantly point out the differences between the claimed invention and the Kawanishi and Lee references. Although these amendments do not appreciably affect the scope of the claims, they are useful to compare the present invention to the cited references.

Using Claim 21 as an example, the present invention comprises: (1) a first layered structure comprising a first MQW layer; and (2) a second layered structure comprising a second MQW layer formed thereon. A first butt-joint is formed through the formation of the second layered structure. However, the formed second MQW layer typically has many defects in the vicinity of the first butt-joint portion. As shown in FIGS. 4A-4E and the accompanying description, the present invention provides a specific methodology to cure this problem.

Specifically, a portion of the second MQW layer in the vicinity of the first butt-joint is removed, and a third optical waveguide made of bulk crystal is formed to address the defects

just described. After this process, the first optical waveguide comprising the first MQW layer, the third optical waveguide made of bulk crystal and the second optical waveguide comprising the second MQW layer are connected. Using this process, the optical device of the present invention has a decrease in power consumption when compared to a single MQW channel optical device.

The Kawanishi and Lee references do not address this methodology. Referring to FIGS. 4A and 4B, Kawanishi describes an absorbing layer 122 and active layer 162 that are butt-jointed. However, Kawanishi does not describe whether these layers 122, 162 are MQW, bulk crystal or some other material. Kawanishi does not discuss the increased instance of defects that occur in the second MQW layer of the present invention, and Kawanishi, therefore, does not describe the specific manufacturing method that is claimed in the present invention as a solution to this problem. Moreover, as a general premise, Kawanishi does not teach or suggest a bulk waveguide between first and second MQW layers, the very nature of the present claims.

The Lee articles describe an MQW-to-MQW butt-coupling technique. Prior to a selective regrowth of a second MQW layer, Lee teaches that “the pattern was formed by reactive ion etching and wet chemical treatment was used for removing the damage layer.” In the presently claimed invention, the defect is produced in the vicinity of a butt-joint in the second MQW layer. In Lee, the reactive ion etching produces the defect, the defect is removed and a second MQW layer is produced that has a butt-joint with the first MQW layer. The Lee process, therefore, is not the same as that claimed in the present invention, and does not address the fundamental problem described herein. In short, as with Kawanishi, the Lee articles do not teach or suggest a bulk waveguide between first and second MQW layers, the very nature of the present claims.

### Conclusion

In view of all the above, Applicant respectfully submits that certain clear and distinct differences as discussed exist between the present invention as now claimed and the prior art references upon which the rejections in the Office Action rely. These differences are more than sufficient that the present invention as now claimed would not have been anticipated nor rendered obvious given the prior art. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

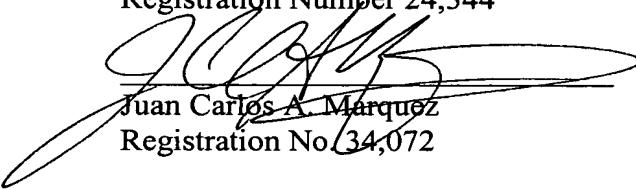
In view of the foregoing amendments and remarks, it is respectfully submitted that the application is in condition for allowance.

Favorable reconsideration of this application is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and phone number indicated below.

Respectfully submitted,

---

Stanley P. Fisher  
Registration Number 24,344



Juan Carlos A. Marquez  
Registration No. 34,072

---

Robert D. Kucler  
Registration No. 45,908

**REED SMITH LLP**  
3110 Fairview Park Drive  
Suite 1400  
Falls Church, Virginia 22042  
(703) 641-4200  
**August 26, 2004**